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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

YUAN, KATHLEEN S

ART UNIT

PAPER NUMBER

2624

NOTIFICATION DATE

DELIVERY MODE

09/03/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/621,260	Applicant(s) XIAO ET AL.	
	Examiner KATHLEEN S. YUAN	Art Unit 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 August 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-70 is/are pending in the application.
- 4a) Of the above claim(s) 2-25,32-40,42,46-50,52-54,56,60-66,68-70 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 41,43-45,51,55,57,58,67 is/are allowed.
- 6) ☒ Claim(s) 1,26-31 and 59 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The response received on 8/10/2009 has been placed in the file and was considered by the examiner. An action on the merit follows.

Response to Amendment

1. The amendments filed on 10 August 2009 have been fully considered. Response to these amendments is provided below.

Summary of Amendment/ Arguments and Examiner's Response:

2. The applicant has amended in three different limitations into the independent claims and has argued that the prior art does not teach these limitations.
3. *The applicant provides arguments on pages 17-18 for claim 55.*
4. The amendments for claim 55 render the claim allowable, so all arguments are moot. See below.
5. *The applicant argues for claim 1 on pages 19-21, stating that Viola's pre-filter stage is limited to using the sign information of a one-dimensional weak learner, the discrimination capability of Viola's decision function fails to include "a linear...procedure." The applicant argues that Wright, Ai and Rowley fail to remedy the deficiencies.*
6. The examiner disagrees. By interpreting the Prefilter stage as the examiner has interpreted for claim 45 of the previous rejection, and with the

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combination of Wright with the interpretation of Viola, all the claim limitations are met, as described below.

7. *The applicant argues on pages 22-24 that for claim 41, Ai et al does not disclose wavelet transformations in SVM processes.*

8. Applicant's arguments with respect to claim 41 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

9. Claim 41 is objected to because of the following informalities: There is a clerical error. Claim 41 recites the limitation of “the SMV filtering process” in the second to last line, in which the examiner believes the applicant intends to claim “the SVM filtering process.” If this is not a clerical error, then “the SMV filtering process would have insufficient antecedent basis. Appropriate correction is required.

Claim Rejections - 35 USC § 112

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 1, 26-31 and 59 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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12. Claim 1 recites two separate “a processor” in the first and second clause of the claim. IT is unclear if the processor is the same processor or separate processors (i.e. a first processor and a second processor.)

13. Claim 27 recites an equation in which the second part of the equation is not clearly defined. The claim only states how it is acquired. Furthermore, the claim does not define any of the functions/ variables within the decision function separately, i.e. a_1 , a_2 , $f_1(x)$, b_1 , r , etc.

14. Claim 59 recites the limitation of “a weak learner.” It is unclear if the applicant is referring to the previously claimed weak learner, or if the applicant is claiming a different, second weak learner.

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. Claims 1, 26, 28-31 are rejected under 35 U.S.C. 103(a) as being and unpatentable over Viola et al in view of Wright et al and “A Subspace Approach to Face Detection with Support Vector Machines” (Ai et al) and noted with Rowley et al.

Regarding claim 1, Viola et al discloses a method for use in detecting faces within a digital image (page 1, paragraph 2, lines 2-3), the method

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comprising: processing, in a processor, that which carries out the process of Adaboost such as the Intel Pentium III (page 1-2, paragraph 2), in a pre-filter stage, the filtering stage in paragraph 3 of page 2, and the first part of the boosting chain of paragraph 4 on page 2 (fig. 6, items 1 and 2) a set of digital image data to produce a set of initial candidate portions, the subwindows that are passed on to node 3 of fig. 6, using at least one feature based algorithm, a haar based feature algorithm (page 2, paragraph 3) the prefilter stage including a linear filter, the linear filter being the linear filter of node 1 to node 2 of fig. 6, based on a decision function (fig. 6, decision of T or F) having coefficients that are determined during a learning procedure, the learning procedure being shown in fig. 2, and the coefficients being defined in any of the equations, processing, in a processor, that which carries out the process of Adaboost such as the Intel Pentium III (page 1-2, paragraph 2), in a boosting filter stage, the set of initial candidate portions that are “integral images”, in a boosting filter stage that uses a boosting chain (fig. 6, node 3 and further processing), or interpreted as each stage as part of a chain, carried out by AdaBoost to produce a set of intermediate candidate portions (page 2, paragraph 4); and processing said set of intermediate candidate portions in a post-filter stage to produce a set of final candidate portions, “promising regions” (page 2, paragraph 5). The post filter stage is more complex processing of finding a face (page 2, paragraph 5). Viola et al further discloses that the boosting filter stage includes a chain having a plurality of boosting chain nodes/ classifiers (1, 2, 3 are the three nodes shown on the fig. on page 12) to identify candidate portions (page 12, paragraph 3 and

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fig. on page 12, the output of further processing), and a function following each of the plurality of boosting chain nodes during training, since each classifier contains a function that processes negative examples to see if there are many false positives (page 14, paragraph 3). It is noted that Rowley et al discloses it is known in facial detection that training sets by using non-faces is called a "bootstrap method" (page 1, paragraph 3- page 2, paragraph 1); therefore, since the same is being done in Viola, Viola discloses such a bootstrap function.

Viola does not disclose expressly that more complex processing to find a face includes an image pre-processing process, a color-filter process, and a support vector machine process and that the bootstrap/ Negative training method uses a weak learner of a previous boosting chain node in training another boosting chain node of the boosting chain.

Wright et al discloses it is known to carry out a set of instructions using a processor and memory with instructions executable by the processor (page 2, paragraph 15) and that in training a boosting chain using negative training sets, a weak learner of a previous boosting chain node, what Wright et al calls a "stump", is used in training another stump by using the previous 4 misclassifications and weights/ weak learners of the previous stump (page 17, paragraph 133).

Viola and Wright et al are combinable because they are from the same field of endeavor, i.e. training a boosting chain for region classification.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to train the boosting chain using the previous weak learners.

The suggestion/motivation for doing so would have been to provide a more accurate recognition by learning from earlier mistakes.

Viola (as modified by Wright and noted with Rowley et al) does not disclose expressly that more complex processing to find a face includes an image pre-processing process, a color-filter process, and a support vector machine process

Ai et al discloses a way of finding a face includes an image pre-processing process: creating a skin color model or training images, etc (fig. 1), a color-filter process (fig. 1, "Skin color segmentation), and an SVM process (fig. 1, "Linear SVM classifier").

Viola et al (as modified by Wright and noted with Rowley et al) and Ai et al are combinable because they are from the same field of endeavor, i.e. facial image detection.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the process of pre-processing, color-filtering, and SVM to detect faces.

The suggestion/motivation for doing so would have been to provide the most robust method by providing an easier and efficient way to find faces.

Therefore, it would have been obvious to combine the boosting chain of Viola (as modified by Wright and noted with Rowley et al) with the face detection of Ai et al to obtain the invention as specified in claim 1.

17. Regarding claim 26, Viola et al discloses at least one feature based algorithm uses Haar-like features (page 4, paragraph 2).

18. Regarding claim 28, Viola et al discloses that at least one feature-based algorithm uses extended features (fig. 1, D, which corresponds to fig. 12c of the applicant's specification which is extended features).

19. Regarding claim 29, Viola et al discloses at least one feature-based algorithm uses mirror invariant features (fig. 1, c, which corresponds to fig. 12e of the applicant's specification of mirror invariant features).

20. Regarding claim 30, Viola discloses that an extra constraint of the mirror invariant, the 2nd white box in fig. 1, is added to reduce the size of a feature set associated with the mirror invariant features,)page 4, paragraph 2).

21. Regarding claim 31, Viola et al discloses at least one feature-based algorithm uses variance features (fig. 1, A, which corresponds to fig. 12h of the applicant's specification of variance features.)

Allowable Subject Matter

22. Claims 41, 43-45, 51, 55, 57, 58 and 67 are allowed. Claim 59 would be allowable if the applicant overcomes the 112, 2nd paragraph rejection above.

23. Claim 41 contains allowable subject matter regarding detecting the face using the specific boosting filter stage and post filtering the output of the boosting

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filter using a pre processing process, a color filtering process, and an SVM filtering process, the SVM process to perform wavelet transformation on the set of intermediate candidate portions/ the portions output by the bootstrap function.

24. Claim 55 contains allowable subject matter regarding the boosting filter stage where a set of initial candidate portions are processed using a boosting chain to produce a set of intermediate candidate portions, wherein the boosting chain's nodes identify candidate portions and a boot strap function follows each of the plurality of nodes, the boot strap function using a weak learner of the previous node in training another node, the weak learner including building a simple decision stump on a histogram of a Haar-like feature on a training set.

25. Claim 27 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, and if rewritten to overcome the outstanding 112 2nd paragraph rejection. Prior art does not disclose the decision function being the claimed decision function.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KATHLEEN S. YUAN whose telephone number is (571)272-2902. The examiner can normally be reached on Monday to Thursdays, 9 AM to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Werner can be reached on (571)272-7401. The fax

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phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KY.
8/28/2009

/Brian P. Werner/
Supervisory Patent Examiner, Art Unit 2624